and gives you what it sees. Now, alpha-numeric data and digital display data are exclusive types of transmissions or exclusive formats of data so the Hark verifier has incorrectly interpreted alpha as alpha and has given us a code that doesn't really make much sense because it was an alpha traffic. Didn't correctly interpret it, let me rephrase that, it wrote down what it seen and what it seen was on the 152.51 channel WAWEAJJJ, and on the 251.48 channel is also recognized WAWEAJJJ. The numeric message content of the two pages on 251.51, the numeric message was 7367791, and the numeric message on the 152.48 channel was 7367791. The time of the -- time and date of the page from the 152.51 channel was 10/28/92 at 4:30.54, 1630 and 54 seconds, the message from 152.48 was 10/28/92 at 1631 and 35 seconds, slightly after that. So, it would be unreasonable to assume that someone else generated a page to this cap code with this message content at random and had them show up on two different channels at the same time, virtually within minutes of each other, to the same cap code, with the same message accidentally or unintentionally. Now, the second page -- the second -- shall read another one?

Q Sure, go ahead and give me another one.

A The second one, the cap code was 0008027 on both, address 3, identical, but the, the alpha message is identical, V5T0 at JJJ, V5T0 at JJJ, the numeric message was 6754340 in both cases, same day, same minute, virtually one minute or two

apart. So, as we look down through here we seen that the correlation that we identified was that every 152.48 page, virtually, and I'm not -- maybe not every one, but virtually every one of the 152.48 pages that we found were also in 152.51. And in my opinion, there's only one place that could have occurred, at the Capitol terminal location and in my opinion it was intentional.

Q Is there a standard protocol for operating this Hark verifier?

A There is a standard setup procedure, yes.

Q Does the manufacturer give you an instruction manual or something?

A Yes, they do.

Q Did you follow the instruction manual when you're doing this testing?

A Yes, we did.

Q Did you modify the equipment in some way other than the, the way the manufacturer makes it?

A I -- no, I didn't.

Q Did you use the Hark verifier back in 1990 when you had that other interference problem?

A No. Unfortunately, digital paging in 1990 was a rapidly growing business and there -- we didn't know the way to actually decode the messages that were going out on the air. Hark came out with the verifier in March of '91 and we

promptly got a demo unit in and tried it out and liked it. There's no doubt that it's, it's a very reliable and indispensable tool that any paging company needs to have to, to, to verify that the page went out over the air. When you're serving the medical community, legal community, law enforcement, you -- as the carrier you, you have to be confident that when a message is generated it was sent. Now, the caveat to that is that, again, paging just is not -- any kind of rf is just not 100-percent reliable. If you walk in a multi-path area or get a little multi-path fading you might miss a digit or two in your display. You might -- just as driving down the road in your, in your car tune to an FM station and hear a "ffttt," a little piece of static there, that's going to happen. And when you're transmitting data during that little phaseout period, the data is not going to be intelligible by the receiver. So, as the carrier, the only way that you can verify that you did your job as the carrier is to make sure that the page went out over the air and that's what the Hark verifier does for you. It doesn't guarantee that the page was ever received by anyone. It only proves that the carrier did its best job in delivering the page to the, to the air.

Q And, and this terrific gizmo simply didn't exist back in the, the fall of 1990?

A I didn't see it any. And as soon as we found out

that Hark manufactured one, Hark is the manufacturer, it's called the Verifier, so that's why we call it the Hark verifier, came out with that in March of 1991. And at a trade show shortly after that we, we got right on it and, and got one and it tried it out and, and it was, it was so phenomenal that we now have two of them.

Q So, you'd been using it for a little while before you actually tested -- used the thing for this particular interference problem?

A We had some experience with it. I don't recall exactly when we took delivery of the, the two -- the second unit, but we had, we had experience with it, yes.

Q You had mentioned doctors, ambulances, police officials, etc. Are these actual RAM customers you're referring to?

A Yes.

Q Service to doctors and ambulances?

A Yes.

Q Were these customers during these periods of interference?

A Oh, yes.

COURT REPORTER: Could you speak up, please?

MR. BOBBITT: Yes, I'm sorry. Yes, they were.

BY MR. JOYCE:

Q So, it's possible that the interference would have

caused pages to ambulance services and doctors not to go out?

A It's possible, and it, it occurred -- happened that way. As -- RAM Technologies also owns an answering service that again caters heavily to the, the medical community and they are the first ones to hear a complaint when they generate a page and the doctor doesn't receive it, and we receive numerous complaints as to that problem.

Q Weren't you also providing service to sheriffs or some kind of police officials?

A Yes. Drug-enforcement agencies, sheriffs, local police departments.

Q So, the same thing I presume, the interference problem could have affected their service as well?

A Could have and did, yes.

Q Were you aware of any efforts by Capitol to work with RAM to try to eliminate this interference?

A Yes, yes.

Q What were those efforts?

A In the later stages -- the, the early stages we found were, were not very cooperative. In the later stages, I don't know what prompted the response, but we did, we did see busy monitors go on the air. We had, we had offered to build or to jointly build a wire line control to make that a little bit more reliable than rf but Capitol declined to do that. So, in the later stages there, there was cooperation, yes.

Q What approximate time frame would you say that was?

A I don't remember.

Q Was it before or after the, the time period when you did the Hark verifier reports?

A Before.

Q So, the interference occurred even after they were busy monitoring?

A Oh, yes, yes. In, in my opinion -- and, and what seems obvious to me is that the interference just continued to take a more sophisticated nature. Whereas, the early stages we had interference which was very easily identified as broadcast band radio traffic on the control link. I don't know where it came from, but it was very easy to, to, to say somebody is keying a transmitter on our link frequency and holding up a microphone to a speaker. It was, it was very simple. The next level was simultaneous data or digital traffic that sounded stereo. A little bit harder to determine because it's digital so your can't pick out the message, you don't know where it came from necessarily, although the station I.D. told us appropriately where it came from. The next level which was what we heard was testing which was completely inappropriate to, to make sure that you're system is working, continuous testing of a pair or several pages, I don't know exactly how many it was, but pagers, but for hours and hours on end these test pages going out of the air which

might have been a loophole, you know, well, we're testing the system, I don't know. So, and then finally, true digital traffic that needs to have some other level of technology to determine what it is. So, it's, it's been -- yes, there was interference both before and after, but it just continued to get more complicated to track and identify.

Q Would it have been possible for Capitol to override this busy monitor?

A Oh, Yeah. Turn it off.

Q Where, where typically is this busy monitor located?

A Physically, the receiver needs to be under the umbrella of the co-channelee's transmitter. So, in other words, if, if, if I need to monitor a city that's too far away to hear from where I'm standing, in other words, where my terminal is, I need to put a receiver up there under the umbrella of the, of the transmitter, feed that signal back to the, to the terminal so that the terminal can effectively hear the local signal and know when to transmit and when not to transmit.

Q So, you're, you're calling a busy monitor or receiver, that's presumably the technical --

A A busy monitor is basically a receiver that's tuned to the channel that you're not supposed to be transmitting on while that receiver is receiving a signal. So, it's an exclusive -- logically, it's an exclusive gate there. We're

going to listen to the channel, if it's idle we'll transmit, if it's busy we won't. And that's why we call it a busy monitor. It's really just a receiver listening to the channel and the squelch is the receiver is what we're looking at so that when there's something on the air the squelch opens up and we say oops, there's something on the air. When, when something is not, the squelch will close down, silencing the receiver, closing the relay that says it's busy or not and that's the signal that we look at.

Q But that happens automatically. You say we, you're referring to the equipment I presume.

A Yeah, yeah, the -- that's right, it's very automatic.

Q It's -- it does that automatically? It's attached to the transmitter so that --

A No, it's, it's close to the transmitter in the same city, the same umbrella of coverage. And the signals from it -- whether they're local to the terminal or remove from the terminal, those control signals need to be relayed back to the terminal so that the terminal can respond.

Q I see. So, the busy monitor could have been in, in Capitol's office or it could have been in a shack near the transmitter? There are a couple of different places it could have been?

A Capitol's busy monitor?

Q Yes.

A Yes, could have been. As long as it can hear RAM's transmitter.

Q It wouldn't have been able to monitor outside of the Charleston/Huntington areas where their transmitters aren't located unless they happened to put one further away? Just so I understand.

A That's right. They wouldn't be able to listen to Lexington, simply because they can't hear the Lexington signal from Charleston. Had they desired to, they would have had to put a receiver in Lexington and transfer -- or transport that signal back to that -- the control signals back to the terminal.

Q But that, that is a fairly common way of sharing these frequencies to avoid co-channel interference to have this busy monitor?

A That's a common way, and so is wire line control. Where you do away with the receivers entirely and the propensity for a receiver to accidentally open squelch or to hear an interfering signal and false -- you do away with that entirely and purchase a telephone line basically, a telco circuit, that we connect our terminal -- or terminal A to terminal B. So that there's no doubt when the circuit is up on the -- when the circuit is reliable, terminal A says I'm busy, terminal B sees that, there's no question, and vice

versa.

Q And that was the proposal you referred to earlier that, that RAM made to, to Capitol?

A Yes, yes, we did.

Q And it's called -- I've heard a different expressions for this. They call it tieing the terminals together? Is that one way they --

A That's one way. Wire line monitor, exclusive busy circuit. There, there are several terms you might use. But the effect is that we see a physical or an electrical connection at my terminal or terminal A that is sent from terminal B. Not via the airwaves, not via secondary receivers. It's a physical circuit much like a tie line, and that's exactly what it is, a tie line.

Q And a tie line being for, for me, a telephone line I presume?

A Telephone line. If you were in an office, in an office and, and you had an office remote and you could tie the two together, pick up, pick up line 1 if it was the tie line, a busy light would go on to all the other phones and all the other phones would know that line is busy. You would talk to the other line, they would pick up the line, talk to you. It's a, it's a dedicated, 24-hour-a-day, 365-day-a-year circuit purchased from the telco or provided locally and that connects the two terminals together and provides a, a tie line

E&M type signaling function that is -- that's, you know, very reliable.

Q And you're saying that would have been more reliable than both Capitol and RAM using this off air monitoring receiver?

A Yes, it would be more reliable. And it costs mores.

Q What would the approximate cost be?

A Well, the cost is purely distance-sensitive, so it could range anywhere from $100 a month to $500 a month. In our case, I think we checked -- we looked into it, it was around $300 a month to connect the Charleston Capitol terminal and the Ashland RAM terminal together.

Q And you -- that's a total cost? You had offered to split that cost with Capitol? Is that correct?

A Yes, we did.

Q So, it would have been 150 per month for you and 150 for them?

A That's right. And RAM is an interexchanged carrier as Capitol well know, we, we could have done that very easily. Capitol was at one time a customer of ours, purchasing DID service on that same network that we had proposed to tie the, the two systems together with.

Q Would that have eliminated any interference problems between your two systems?

A That would have eliminated any busy monitor

problems. That doesn't say that there wouldn't have been other chaining type interference schemes thought of that might still create just as, just as bad of interference. But we couldn't have related it to poor busy monitor design.

Q So, it's fair to say it would have eliminated unintentional interference problems?

A Well, it would have been a much more reliable way of making sure that only one transmitter system was on the air at a time.

Q Okay. I understand. You're, you're having trouble with my saying -- there are various --

A There's various ways you can interfere with, with someone if you want to. The busy monitor only prevents the two transmitter systems from going on the air at one time.

Q And again, just so -- I'm going to get off this busy monitor real soon. But the, the device itself, it's only good if the thing is turned on?

A Of course.

Q And there's, there's just a switch or something you can just flip the thing off and --

A That's right. It's only good if it was -- if it's used as it's intended. I -- we can disconnect the antenna from it, turn the power off, disconnect the connection to the terminal. It's, it's not a fail-safe unit. Just as, you know, your car is only good with four wheels on it. Take out

off and it's not going to run well.

Q Can you tell -- when, when RAM's operating on 152.48, is there some way for you to tell if somebody is not busy monitoring?

A Yes.

Q And how would you tell?

A Well, because our busy monitor circuit not only relays the fact that a channel is on the air or off the air in a remote city, it also relays the audio itself. Then we, we would have the ability to listen to that remote city. We listen to the remote city and if it sounds like two transmitters are on the air at one time and we look at our control system that says we are on the air, well, then we know that there is someone else who's on the air that shouldn't be. Or that -- well --

Q So, were, were there times when you were able to determine that Capitol was not busy monitoring?

A Yes.

Q Were there just a few times, or how many times?

A Well, of course, in the course of these three or four year's worth of this there were several times. Particularly in the early days for several periods of time. And the easiest way to determine that is that while, while RAM's in the middle of a batch of traffic, all of a sudden right in the middle of the batch of traffic, poof, comes a

station I.D. for another transmitter or some other data on top of the channel and then goes away. Well, you know that person was not listening to the channel. And that happened dozens of times in the early-1990 and '91 period.

Q And the station I.D. you associated with Capitol's station I.D.?

A Yes.

MR. JOYCE: I have no further questions.

JUDGE CHACHKIN: We'll take our lunch and recess until 1:45.

(Whereupon, a recess was taken for lunch from 12:39 p.m. until 1:45 p.m..

A F T E R N O O N S E S S I O N

JUDGE CHACHKIN: Back on the record. Mr. Hardman?

MR. HARDMAN: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. HARDMAN:

Q Mr. Bobbitt, at one point shortly before the break you were talking about the -- RAM's customer base on its private carrier paging system in the Charleston/Ashland area and I believe you said, did you not, that the customer base -- significantly since you started in '89. Is that right?

A Yes.

Q And can you translate the customer growth into channel occupancy time on 152.48, at least in general terms over the period of time from let's say fall 1990 when you were -- when you testified you first experienced the interference until -- well, let's say until the fall of last year, '93?

A Specifically?

Q I'd, I'd like to get some idea of, of how the growth in your customer base translated into the increased use of 152.48 by RAM's system.

A As more customers were put on it, it got busier.

Q And --

A And as we, as we expanded our -- got busier also.

Q Okay, and out of an hour let's say, about how much time would be paging by transmission to RAM's pages?

A At what point in time?
Q Well, let's -- are there peaks and valleys?
A Well, I really don't recall traffic statistics verbatim, but the traffic went from not busy to very busy.
Q Well --
A Ten minutes an hour or twenty minutes an hour to forty, fifty minutes an hour.
Q Okay. What I'm trying to establish is the, the trend over a period of time. Now, let's, let's first talk about the character of the paging traffic. Is it your testimony that how busy the channel is with RAM traffic depends upon what time of day you're talking about?
A Yes.
Q Would it also depend on --
A It wasn't my testimony. I don't think I said that. But that's a true statement.
Q All right --
A Traffic varies by time.
Q Okay, and would it be -- would it also be true that some days are busier than other days?
A Yes. I'd agree with --
Q Now, do you have a rule of thumb that you use in your, your business about which are the busiest times for paging traffic?
A No. There are some, some historical statistics you

could probably draw upon. But rule of thumb I don't --

Q Well, what information do you use as part of your duties as the technical manager for RAM to determine when the, the peak demand is for your paging traffic?

A Well, first off, from the rf point of view, we don't. From the telephony point of view, we use a statistic of all trunks busy and try to reduce that down to zero.

Q All right. So, you try to have as many trunks as necessary that no one has to get a busy signal?

A That's --

Q Is that what you mean when you dial --

A Well, as close as possible without, without being sloppy.

Q All right, and about how many telephone trunks does that require at this point?

A I don't know if I should say or not. I, I really don't think it's your business, personally. I'd be glad to say so if you --

MR. JOYCE: Your Honor, it -- Your Honor, that's a fair point. Mr. Hardman and I believe have consented to a confidentiality agreement. These are obviously paging competitors. Information -- current information about the number of customers on RAM's system, number of telephone lines that they need. Some of this information would be considered decidedly confidential by -- so I, I would object on the basis

of, of confidentiality.

JUDGE CHACHKIN: Well, the witness has already indicated the thousands. Seems to me -- of customers they have -- I don't know by telling the number of trunks is particularly confidential.

MR. JOYCE: Well, the, the witness has indicated that it, it is and I have no independent reason for, for denying his assertion that that's -- losing confidential business information.

JUDGE CHACHKIN: You also reveal that they now have generated up to 50 minutes of traffic an hour. That also I assume would be confidential but that's been divulged in the record. I'm going to permit -- I'm not going to require any confidentiality. You can answer the question.

MR. BOBBITT: Yes, sir. Which city would you like?

BY MR. HARDMAN:

Q Well, we're talking about the terminal in Ashland at this point.

A The terminal in Ashland has, has five trunk groups in it.

Q Five trunk groups. Each group has more than one trunk?

A Yes.

Q And how many trunks total would that make?

A Total there are in Ashland 19 trunks I believe.

Q All right. So, that means does it not that, that 19 different pages -- customers could be placing 19 different pages at the same time on your system without incurring a busy signal when they dial in to do so. Is that right?

A It means that customers -- 19 different customers can call in to the terminal simultaneously.

Q Well, do they call in for reasons other than placing a page?

A The pages go out one at a time.

Q I understand that, and I will get to that.

A Yeah.

Q It might move a little faster if you answered the question and let me ask the questions, all right? Now, is it not true that under the engineering of the RAM's network at this point, 19 different customers could be calling in at the same time to place a page?

A Yes.

Q Now, the terminal takes those request for pages does it not, as it processes them it orders them in a sequence, does it not, to transmit over the air?

A Yes.

Q And as you said a moment ago, it transmits a page one at a time?

A That's true.

Q All right.

A On each channel, yes.

Q Now, we're talking 152.48. Was -- did I understand your testimony correctly that the 19 trunks -- 152.48 or did I misunderstand that?

A It's got nothing to do with the channel. Just 19 trunks coming in to the terminal. The subscribers could be assigned to any channel that we have active, which we have two in that terminal.

Q Okay. So, so you use a common trunk -- to, to access pages on -- pagers on both of the PCP and I gather an RCC frequency that RAM has in service? Is that right?

A Yes.

Q Now, the terminal then takes the traffic, the pages that have been requested by customers calling and divides them by frequency that they're going to go out on. Is that right?

A Yes.

Q Okay, and for each frequency then it batches the pages in a sequence and sends out a page one at a time in some sort of queue. Is that right?

A Yes.

Q Now, so it's true is it not that the -- at busy times the -- there may be some delay from the period of time a customer calls in to place a page until the time that it's actually transmitted over the air. Isn't that true?

A Yes.

Q And that period -- the amount of time that the, the -- of delay between the time the customer places the page and it actually goes out over the air can be simply because the system is very busy and there are a lot of customers in the queue. Isn't that true?

A To some extent, yes.

Q To some extent?

A That's one of the factors.

Q That's one of the factors. So, it's true is it not that if the system is very busy there will be a much longer queue of pages waiting to go out over the air than if the system is not busy. Isn't that right?

A That's, that's a fair statement.

Q All right, and if I understood your testimony correctly earlier, the amount of time that a customer has to wait before a page is actually transmitted is an important factor in its view of the quality of service it's getting. Isn't that true?

A To many customers it is, yes.

Q Right. So that if customers have to wait -- feel that they have to wait too long, they, they complain about this don't they?

A Yes.

Q So, the amount of waiting time on a -- any system, especially -- well, the amount of waiting time before a page

is actually transmitted could be a very important consideration from an engineering stand point in maintaining a high quality of service. Isn't that true?

A One of the factors, yes.

Q And, and wouldn't that be one of, one of your principal responsibilities in your present position? Isn't that true?

A Yes.

Q All right. Now, at peak times how long does the -- does your system hold -- back up pages before transmitting them?

A I don't know.

Q Do you get reports on this?

A No.

Q You never pay any attention to it?

A Yeah, I pay attention but it's not a, it's not a factor that you can rely upon because a digital page -- a hundred digital pages may only take 10 seconds to go out.

Q Well, but by the same token, if the system is very busy it may, may wait four or five minutes.

A That's right, it may. So, it's a very, it's a very dynamic variable that's very hard to track because of the composition of the pages as they come in.

Q Right. So, if, if RAM's system all of a sudden started getting to the point where pages were taking four or

five minutes or ten minutes to go out, you, you wouldn't study that problem, you wouldn't monitor that circumstance with reports?

A Consistent -- if it was consistently a problem we would.

Q Well, but I, I --

A Yes.

Q -- think I asked you a moment ago if you did and you testified you didn't. Isn't that right?

A But if it was -- if marketing told me that there's a consistent problem with customers receiving their pages late then we would have to look into it. But there's very little you could do about it except the resource is a resource. The channel is a resource and the best that you can do is to make sure that customers who request pages have a place to pack the page or to park the page and that the channel is available when it's our turn to transmit and, and do our best to transmit them out.

Q Does RAM service as voice pagers?

A Yes. Regrettably.

Q And how, how many digital -- well, let me, let me ask that. I assume it also transmits digital display pages as well.

A Yes.

Q Is that right? Now, how many digital display pages,

approximately, transmit in the time that it takes one voice page?

A It varies.

Q Give me a ball park.

A Could be a -- it could be a short -- it's -- I don't know.

Q We're talking about a voice page a digital display page.

A I don't know. There's, there's --

Q You don't have any idea?

A -- there's too many variables there to answer that question.

Q All right. Let's assume that we're talking about a pox sag 515 signaling format and a 12-second voice message with a two-tone sequential front porch on the voice page. Now --

A I, I just don't know. I mean, I don't --

Q You don't have any idea?

A I don't have those memorized, no.

Q Well, give me a ball park. Are we talking 10, are we talking 100?

A Somewhere in that range.

Q All right. So, you would agree with -- do you not that if you -- to the extent that you have a voice page on the system that the RAM customer, the amount of time that that

page takes in the queue and in channel time requires potentially 100 or perhaps even more customers to wait for their page.

A For 12 seconds?

Q For 12 seconds.

A Yes. Oh, yeah, yeah.

Q Right. Right. So, if you have bunch of voice paging on the channel, that would, would -- that would in fact be waiting time of the entire customer base?

A Yes, it would.

Q So, as you -- in your capacity as for want of a better term chief engineer for the system, you wouldn't get reports monitoring what your customer mix is so that you would have more efficient transmission times on the channel?

A I looked into that occasionally. But again, we're a market-driven company and marketing tells -- doesn't -- I don't dictate that marketing shut off the voice pages unless marketing says the channel's backed up too long, what can we do to stop it? We can migrate off voice, we can go to higher speed digital, from 515 to 1200. Various ways to, to, to -- you know, to make the channel more efficient. I don't dictate to marketing what they can sell and not sell. It's the other way around.

Q Well, but wouldn't it follow that when marketing tells you there's a, there's a problem with customer